OM—06273—01
March 26, 2010

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST

GORMAN-RUPP PUMPS

0 SERIES PUMP

MODEL

03H1—HYD

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
www.grpumps.com
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA Printed in U.S.A.

Register your new
Gorman-Rupp pump online at
www.grpumps.com

Valid serial number and e-mail address required.

RECORD YOUR PUMP MODEL AND SERIAL NUMBER

Please record your pump model and serial number in the spaces provided below. Your Gorman-Rupp distributor needs this information when you require parts or service.

Pump Model: _____

Serial Number: _____

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INTRODUCTION

Thank You for purchasing a Gorman-Rupp pump. **Read this manual** carefully to learn how to safely install and operate your pump. Failure to do so could result in personal injury or damage to the pump.

This pump is an 0 Series, enclosed impeller, self-priming centrifugal model, with straight-in suction without a suction check valve. It is close-coupled to a hydraulic motor and designed for vehicular mounting in petroleum service. The basic material of construction for wetted parts is aluminum, with bronze wear rings.

Because pump installations are seldom identical, this manual cannot possibly provide detailed instructions and precautions for every aspect of each specific application. Therefore, it is the responsibility of the owner/installer of the pump to ensure that applications not addressed in this manual are performed **only** after establishing that neither operator safety nor pump integrity are compromised by the installation. Pumps and related equipment **must** be installed and operated according to all national, local and industry standards.

If there are any questions regarding the pump which are not covered in this manual or in other literature accompanying the unit, please contact your Gorman-Rupp distributor or the Gorman-Rupp Company:

The Gorman-Rupp Company
P.O. Box 1217
Mansfield, Ohio 44901—1217
Phone: (419) 755—1011
or:
Gorman-Rupp of Canada Limited
70 Burwell Road
St. Thomas, Ontario N5P 3R7
Phone: (519) 631—2870

No instructions are provided in this manual for hydraulic motor maintenance. For information or technical assistance on the hydraulic motor, contact the hydraulic motor manufacturer through their website at **www.hydreco.com** and reference the following hydraulic motor model:

Hydreco Model #1512KC60A1FB

The following are used to alert personnel to procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel:

DANGER!

Immediate hazards which WILL result in severe personal injury or death. These instructions describe the procedure required and the injury which will result from failure to follow the procedure.

WARNING!

Hazards or unsafe practices which COULD result in severe personal injury or death. These instructions describe the procedure required and the injury which could result from failure to follow the procedure.

CAUTION

Hazards or unsafe practices which COULD result in minor personal injury or product or property damage. These instructions describe the requirements and the possible damage which could result from failure to follow the procedure.

NOTE

Instructions to aid in installation, operation, and maintenance or which clarify a procedure.

SAFETY - SECTION A

This information applies to 0 Series refueler pumps. Gorman-Rupp has no control over or particular knowledge of the vehicle chassis which will be used. Refer to the manual accompanying the power source before attempting to begin operation.

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Switch off the vehicle ignition and remove the key, or take other precautions to ensure that the pump will remain inoperative.**
3. **Allow the pump to completely cool if overheated.**
4. **Check the temperature before opening any covers, plates, or plugs.**
5. **Close the suction and discharge valves.**
6. **Vent the pump slowly and cautiously.**
7. **Drain the pump.**

WARNING!

This pump is designed for vehicular mounting in petroleum service. Do not attempt to pump corrosive materials, or any liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING!

Be certain proper safety practices are followed before operating or servicing the pump. Provide adequate ventilation, prohibit smoking, wear static resistant clothing and shoes. Clean up all fuel spills immediately after occurrence.

WARNING!

Do not operate the pump against a closed discharge valve for long periods of time. If operated against a closed discharge valve, pump components will deteriorate, and the liquid could come to a boil, build pressure, and cause the pump casing to rupture or explode.

WARNING!

Overheating may produce dangerous fumes. Take precautions to ensure the area surrounding the pump is adequately ventilated. Allow the pump to cool and use extreme caution when venting the pump, or when removing covers, plates, plugs, or fittings.

WARNING!

Do not remove plates, covers, gauges, pipe plugs, or fittings from an overheated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. Allow the pump to completely cool before servicing.

WARNING!

Overheated pumps can cause severe burns and injuries. If overheating of the pump occurs:

1. **Stop the pump immediately.**
2. **Ventilate the area.**
3. **Allow the pump to completely cool.**
4. **Check the temperature before opening any covers, plates, gauges, or plugs.**
5. **Vent the pump slowly and cautiously.**
6. **Refer to instructions in this manual before restarting the pump.**

WARNING!

After the vehicle is positioned for pump maintenance, block the wheels and set the emergency brake before attempting to remove the pump. Be Sure the pump is properly reinstalled and secure before operation.

CAUTION

Never run the pump dry of pumping medium. There must be a supply of liquid to the pump at all times to prevent destruction of the shaft seal faces.

INSTALLATION – SECTION B

Review all SAFETY information in Section A.

Since pump installations are seldom identical, this section offers only general recommendations and practices required to inspect, position, and arrange the pump and piping.

Most of the information pertains to a standard **static lift** application where the pump is positioned above the free level of liquid to be pumped.

If installed in a **flooded suction application** where the liquid is supplied to the pump under pressure, some of the information such as mounting, line configuration, and priming must be tailored to the specific application. Since the pressure supplied to the pump is critical to performance and safety, **be sure** to limit the incoming pressure to 50% of the maximum permissible operating pressure as shown on the pump performance curve (see Section E, Page 1).

For further assistance, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

PREINSTALLATION INSPECTION

The pump assembly was inspected and tested before shipment from the factory. Before installation, inspect the pump for damage which may have occurred during shipment. Check as follows:

a. Inspect the pump assembly for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose attaching hardware. Since gaskets tend to shrink after drying, check for loose hardware at mating surfaces.

c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated.

d. If the pump and gearbox have been stored for more than 12 months, some of the components or lubricants may have exceeded their maximum shelf life. These **must be inspected or replaced** to ensure maximum pump service.

If the maximum shelf life has been exceeded, or if anything appears to be abnormal, contact your Gorman-Rupp distributor or the factory to determine the repair or updating policy. **Do not** put the pump into service until appropriate action has been taken.

PUMP INSTALLATION

Pump Dimensions

See Figure 1 for the physical dimensions of the pump.

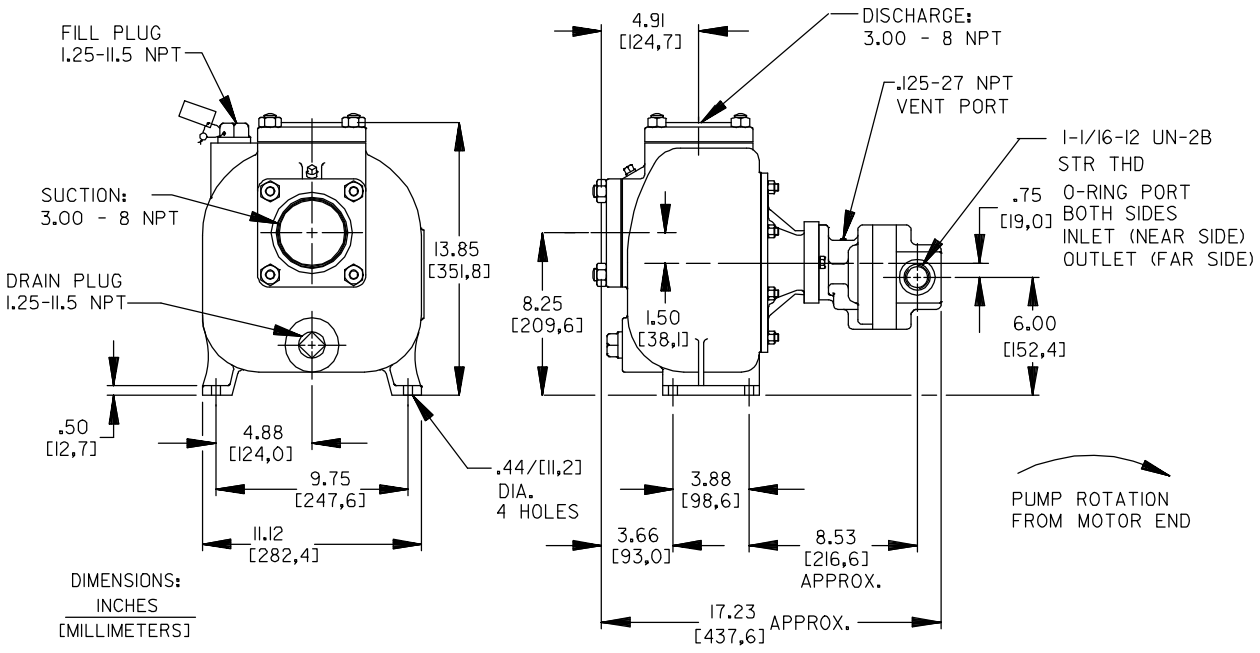


Figure 1. Pump Model 03H1—HYD Dimensions

VEHICLE REQUIREMENTS

The following instructions apply equally to new installations, rebuilds or retrofits.

Tank Preparation

It is **essential** that any tank scale, dirt, or other foreign material be removed from the tank and piping prior to pump installation. Failure to do so could result in clogging or damage to the pump.

CAUTION

Damage to the pump resulting from debris in the suction line **will not** be covered by the pump warranty.

Before connecting the suction and discharge piping, carefully check the storage tank and piping for construction debris such as nuts, bolts, wire, weld slag, and other foreign material. Install a commercially available 80 mesh screen in the suction line to prevent debris from entering the pump.

POSITIONING PUMP

Lifting

Pump unit weights will vary depending on the mounting and drive provided. Check the shipping tag on the unit packaging for the actual weight, and use lifting equipment with appropriate capacity. Drain the pump and remove all customer-installed equipment such as suction and discharge hoses or piping before attempting to lift existing, installed units.

CAUTION

The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around the pump.

Mounting

Level mounting is essential for proper operation. The pump may have to be supported or shimmed to provide for level operation or to eliminate vibration. The pump must be mounted on a rigid, vibra-

tion-free base or platform. The pump should be placed directly over a beam or as near to a main support as possible.

Any damage to the pump resulting from improper mounting and installation is not covered by the Gorman-Rupp warranty.

When filling the tank, locate the pump in an accessible place as close as practical to the fuel being pumped. Vertical distance (static suction lift) should be kept to a minimum. High static lift and a long suction line results in a longer period of time required to prime the pump. They also tend to limit the maximum amount of liquid pumped.

Hydraulic Motor Connections

Remove the plug in the top of the motor and install a vent line back to the hydraulic tank in the plug opening. Connect the hydraulic lines to the appropriate openings in the motor as indicated by the decals on the motor. Pressurize the hydraulic system and check for leaks before putting the pump into service.

SUCTION AND DISCHARGE PIPING

Materials

Either pipe or hose maybe used for suction and discharge lines; however, the materials must be compatible with the liquid being pumped. If hose is used in suction lines, it must be the rigid-wall, reinforced type to prevent collapse under suction. Using piping couplings in suction lines is not recommended.

Line Configuration

Keep suction and discharge lines as straight as possible to minimize friction losses. Make minimum use of elbows and fittings, which substantially increase friction loss. If elbows are necessary, use the long-radius type to minimize friction loss.

Connections to Pump

Before tightening a connecting flange, align it exactly with the pump port. Never pull a pipe line into place by tightening the flange bolts and/or couplings.

Lines near the pump must be independently supported to avoid strain on the pump which could cause excessive vibration, decreased bearing life, and increased shaft and seal wear. If hose-type lines are used, they should have adequate support to secure them when filled with liquid and under pressure.

Gauges

This pump has a 1/4-inch NPT tap on the suction side for installation of a vacuum suction gauge.

If a discharge pressure gauge is desired, drill and tap the discharge line in a visible location approximately three pipe diameters away from any fittings or points of turbulent flow. Installation closer to the pump may result in erratic readings.

SUCTION LINES

To avoid air pockets which could affect pump priming, the suction line must be as short and direct as possible. When operation involves a suction lift, the line must always slope upward to the pump from the source of the liquid being pumped; if the line slopes down to the pump at any point along the suction run, air pockets will be created.

Fittings

Suction lines should be the same size as the pump inlet. If reducers are used in suction lines, they should be the eccentric type, and should be installed with the flat part of the reducers uppermost to avoid creating air pockets. Valves are not normally used in suction lines, but if a valve is used, install it with the stem horizontal to avoid air pockets.

Strainers

A suction strainer was not furnished with this pump since it is **not** designed to handle liquids containing solids. However, to protect the pump from accidental damage a commercially available 80 mesh screen should be installed in the suction line. Make certain that the total open area of the screen is at least three or four times the cross section of the

suction line to ensure an adequate supply of liquid to the pump.

CAUTION

Damage to the pump resulting from debris in the suction line will not be covered by the pump warranty.

Before connecting the suction and discharge piping, carefully check the storage tank and piping for construction debris such as nuts, bolts, wire, weld slag, and other foreign material. Install a commercially available 80 mesh screen in the suction line to prevent debris from entering the pump.

Sealing

Since even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift, all connections in the suction line should be sealed to ensure an airtight seal. Follow the sealant manufacturer's recommendations when selecting and applying the sealant. The sealant should be compatible with the liquid being pumped.

WARNING!

A leak at any point in the system may expel flammable vapor into the atmosphere. Be sure the pump and surrounding area are adequately ventilated. Check all connections for leaks and correct any problems immediately.

DISCHARGE LINES

Siphoning

Do not terminate the discharge line at a level lower than that of the liquid being pumped unless a siphon breaker is used in the line. Otherwise, a siphoning action causing damage to the pump could result.

Valves

If a throttling valve is desired in the discharge line, use a valve as large as the largest pipe to minimize friction losses. Never install a throttling valve in a suction line.

A check valve in the discharge line is normally recommended, but it is not necessary in low discharge head applications.

With high discharge heads, it is recommended that a throttling valve and a system check valve be installed in the discharge line to protect the pump from excessive shock pressure and reverse rotation when it is stopped.

CAUTION

If the application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

Bypass Lines

If it is necessary to permit the escape of air into atmosphere in initial priming or during the repriming cycle, install a bypass line - sized to that it will not affect pump discharge capacity - between the pump and the discharge check valve. Since the pump does not use a suction check valve, the end of the bypass line must be submerged in the liquid being pumped in order to maintain suction.

OPERATION — SECTION C

Review all SAFETY information in Section A.

Follow the instructions on all tags, labels and decals attached to the pump.

INTRODUCTION TO PUMP OPERATION

This pump is designed to produce 300 gallons per minute and functions in the following manner.

During the priming cycle, air from the suction line entering the pump is mixed with fuel at the impeller. Centrifugal force moves the mixture into the pump housing reservoir, where the velocity of the mixture is decreased. Air escapes through the discharge port while air-free fuel, now heavier than air-laden fuel, flows by gravity back down into the impeller and mixes with air, which continues to be drawn from the suction line. As this cycle is repeated, all air in the suction line is evacuated and a vacuum is created. Atmospheric pressure forces the fuel in the suction line to the impeller and pumping begins. Fuel no longer recirculates within the pump.

When pumping petroleum-based fuels, fuel temperature is critical to maximum pumping efficiency and performance. The temperature of the fuel must remain below the temperature at which the fuel tends to turn to vapor. If the fuel temperature approaches its vapor pressure, the impeller will tend to atomize the fuel, resulting in vapor pressure or air bubbles. Air bubbles will burst in the eye of the impeller, causing excessive vibration and shortening pump life.

CAUTION

Whether new installation or rebuild of refueler, the following requirements apply:

1. It is essential that tank scale, dirt, and any other foreign elements be removed from the tank and piping prior to pump installation.
2. The gearbox was shipped dry of lubricant. Lubrication **must** be added before any operation.
3. The pump must **not** be run dry of product at any time.

WARNING!

This pump is designed for vehicular mounting in petroleum service. Do not attempt to pump corrosive materials, or any liquids which may damage the pump or endanger personnel as a result of pump failure.

PRIMING

Install the pump and piping as described in **INSTALLATION**. Make sure that the piping connections are tight, and that the pump is securely mounted. Check that the pump and gearbox are properly lubricated (see **LUBRICATION** in **MAINTENANCE AND REPAIR**).

Although this pump is self-priming, it should never be operated unless there is liquid in the pump casing.

CAUTION

Never operate this pump unless there is liquid in the pump casing. The pump will not prime when dry. Extended operation of a dry pump will destroy the seal assembly.

Add liquid to the pump casing when:

1. The pump is being put into service for the first time.
2. The pump has not been used for a considerable length of time.
3. The liquid in the pump casing has evaporated.

When installed in a flooded suction application, simply open the system valves and permit the incoming liquid to evacuate the air. After the pump and piping system have completely filled, evacuate any remaining air pockets in the pump or suction line by loosening a pipe plug or opening bleeder valves.

Once the pump casing has been filled, the pump will prime as long as positive suction head is available.

To fill thepump, remove the fill plug in the top of the pump casing and add clean liquid. Be certain to reinstall the fill plug before operating the pump.

WARNING!

After filling the pump casing, do not attempt to operate the pump unless the fill plug and all connecting piping is securely installed. Otherwise, liquid in the pump could be forced out under pressure, resulting in injury to personnel.

GROUNDING

To eliminate electrostatic build-up by the liquid being pumped, the pump must be grounded by attaching a ground wire to a ground rod (grounding is not required if pumping water). Install the ground rod in accordance with the National Electrical Code and all local codes. Be sure the clamp or fastener has made a tight electrical connection with the rod.

CAUTION

Inspect and test the ground wire assembly for conductivity. Replace broken or frayed wire before resuming operation.

STARTING

Consult the operations manual furnished with the vehicle**.**

Rotation

The correct direction of pump rotation is counterclockwise when facing the pump suction. The pump could be damaged and performance adversely affected by incorrect rotation. If pump performance is not within the specified limits (see the curve on page E-1), check the direction of rotation before further troubleshooting.

CAUTION

Only operate the input shaft in a counterclockwise direction when facing the pump suction. Otherwise, pump performance will be adversely affected, and the pump and/or gearbox could be seriously damaged.

OPERATION

WARNING!

Do not operate the pump against a closed discharge valve for long periods of time. If operated against a closed discharge valve, pump components will deteriorate, and the liquid could come to a boil, build pressure, and cause the pump casing to rupture or explode.

Operating Controls

Since Gorman-Rupp has no control over the actual installation, it is the obligation of the tank builder or the installer to devise controls to **safely** operate the pump. All instructions and operational procedures for the pump and system **must** be provided to the pump operator.

OPERATING CHECKS

Lines With a Bypass

Since this pump does not have a suction check valve, the discharge end of the bypass line must be submerged in order to maintain suction.

Close the discharge throttling valve and open the shutoff valve in the bypass line so that the pump will not have to prime against the weight of the liquid in the discharge line. Start the hydraulic motor. When the pump is fully primed and liquid is flowing steadily from the bypass line, close the bypass shutoff valve and open the discharge throttling valve.

Lines Without a Bypass

Open all valves in the discharge line and start the hydraulic motor. Priming is indicated by a positive

reading on the discharge pressure gauge or by a quieter operation. The pump may not prime immediately because the suction line must first fill with liquid. If the pump fails to prime within five minutes, stop it and check the suction line for leaks.

After the pump has been primed, partially close the discharge line throttling valve in order to fill the line slowly and guard against excessive shock pressure which could damage pipe ends, gaskets, sprinkler heads, and any other fixtures connected to the line. When the discharge line is completely filled, adjust the throttling valve to the required flow rate.

Leakage

No leakage should be visible at pump mating surfaces, or at pump connections or fittings. Keep all line connections and fittings tight to maintain maximum pump efficiency.

Strainer Check

If a suction strainer has been shipped with the pump or installed by the user, check the strainer regularly, and clean it as necessary. The strainer should also be checked if pump flow rate begins to drop. If a vacuum suction gauge has been installed, monitor and record the readings regularly to detect strainer blockage.

Never introduce air or steam pressure into the pump casing or piping to remove a blockage. This could result in personal injury or damage to the equipment. If backflushing is absolutely necessary, **liquid pressure** must be limited to 50% of the maximum permissible operating pressure shown on the pump performance curve (see Section E, Page 1).

Liquid Temperature and Overheating

The **maximum** liquid temperature for this pump is 160° F (71°C). Do not apply it at a higher operating temperature.

Overheating can occur if operated with the valves in the suction or discharge lines closed. Operating against closed valves could bring the liquid to a boil, build pressure, and cause the pump to rupture or explode. If overheating occurs, stop the pump and allow it to cool before servicing it. Refill the pump casing with cool liquid.

WARNING!

Allow an over-heated pump to cool before servicing. Do not remove plates, covers, gauges, pipe plugs, or fittings from an overheated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. After the pump cools, drain the liquid from the pump by removing the casing drain plug. Use caution when removing the plug to prevent injury from hot liquid.

Pump Vacuum Check

Since the pump does not have a suction check valve, the discharge line must be fitted with a check valve if a pump vacuum reading is taken.

With the pump inoperative, install a vacuum gauge in the system, using pipe dope on the threads. Block the suction line and start the pump. At operating speed the pump should pull a vacuum of 15 to 17 inches (381 to 432 mm) or more of mercury when pumping petroleum. If it does not, check for air leaks in the seal, gasket, or discharge valve.

Open the suction line, and read the vacuum gauge with the pump primed and at operation speed. Shut off the pump. The vacuum gauge reading will immediately drop proportionate to static suction lift, and should then stabilize. If the vacuum reading falls off rapidly after stabilization, an air leak exists. Before checking for the source of the leak, check the point of installation of the vacuum gauge.

NOTE

Petroleum products are very sensitive to changes in temperature. Warmer temperatures elevate the product vapor pressure resulting in low vacuum readings. Do not mistake temperature problems for faulty pump installation or performance.

STOPPING

Never halt the flow of liquid suddenly. If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Close all connecting valves slowly.

After stopping the pump, take precautions to ensure that the pump will remain inoperative.

COLD WEATHER PRESERVATION

Unless temperatures are extremely severe, below-freezing conditions will not affect pump operation in pertroleum service. However, during extremely severe conditions care should be exercised during start-up, especially if the pump has been idle for more than a few hours.

TROUBLESHOOTING — SECTION D

Review all SAFETY information in Section A.

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Disconnect the power source or take other precautions to ensure that the pump will remain inoperative.**
3. **Allow the pump to completely cool if overheated.**
4. **Check the temperature before opening any covers, plates, or plugs.**
5. **Close the suction and discharge valves.**
6. **Vent the pump slowly and cautiously.**
7. **Drain the pump.**

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Not enough liquid in casing.	Add liquid to casing. See **PRIMING**.
	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Pump speed too slow.	Check power source output; consult power source operation manual.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See **INSTALLATION**.
	Strainer clogged.	Check strainer and clean if necessary.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct submergence as needed.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont.)	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.
	Strainer clogged.	Check strainer and clean if necessary.
	Impeller clogged.	Free impeller of debris.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See **INSTALLATION**.
	Pump speed too slow.	Check power source output; consult power source operation manual.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high.	Check driver output; check that sheaves or couplings are correctly sized.
	Discharge head too low.	Adjust discharge valve.
PUMP CLOGS FREQUENTLY	Discharge flow too slow.	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.
	Discharge line clogged or restricted; hose kinked.	Check discharge lines; straighten hose.
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.
	Pumping entrained air.	Locate and eliminate source of air bubble.
	Pump or drive not securely mounted.	Secure mounting hardware.
	Impeller clogged or damaged.	Clean out debris; replace damaged parts.
BEARINGS RUN TOO HOT	Bearing temperature is high, but within limits.	Check bearing temperature regularly to monitor any increase.
	Low or incorrect lubricant.	Check for proper type and level of lubricant.
	Suction and discharge lines not properly supported.	Check piping installation for proper support.
	Drive misaligned.	Align drive properly.
	Bearings in power source or gearbox worn or binding.	Check bearings.

PREVENTIVE MAINTENANCE

Since pump applications are seldom identical, and pump wear is directly affected by such things as the abrasive qualities, pressure and temperature of the liquid being pumped, this section is intended only to provide general recommendations and practices for preventive maintenance. Regardless of the application however, following a routine preventive maintenance schedule will help assure trouble-free performance and long life from your Gorman-Rupp pump. For specific questions concerning your application, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Record keeping is an essential component of a good preventive maintenance program. Changes in suction and discharge gauge readings (if so equipped) between regularly scheduled inspections can indicate problems that can be corrected before system damage or catastrophic failure occurs. The appearance of wearing parts should also be documented at each inspection for comparison as well. Also, if records indicate that a certain part (such as the seal) fails at approximately the same duty cycle, the part can be checked and replaced before failure occurs, reducing unscheduled down time.

For new applications, a first inspection of wearing parts at 250 hours will give insight into the wear rate for your particular application. Subsequent inspections should be performed at the intervals shown on the chart below. Critical applications should be inspected more frequently.

Preventive Maintenance Schedule

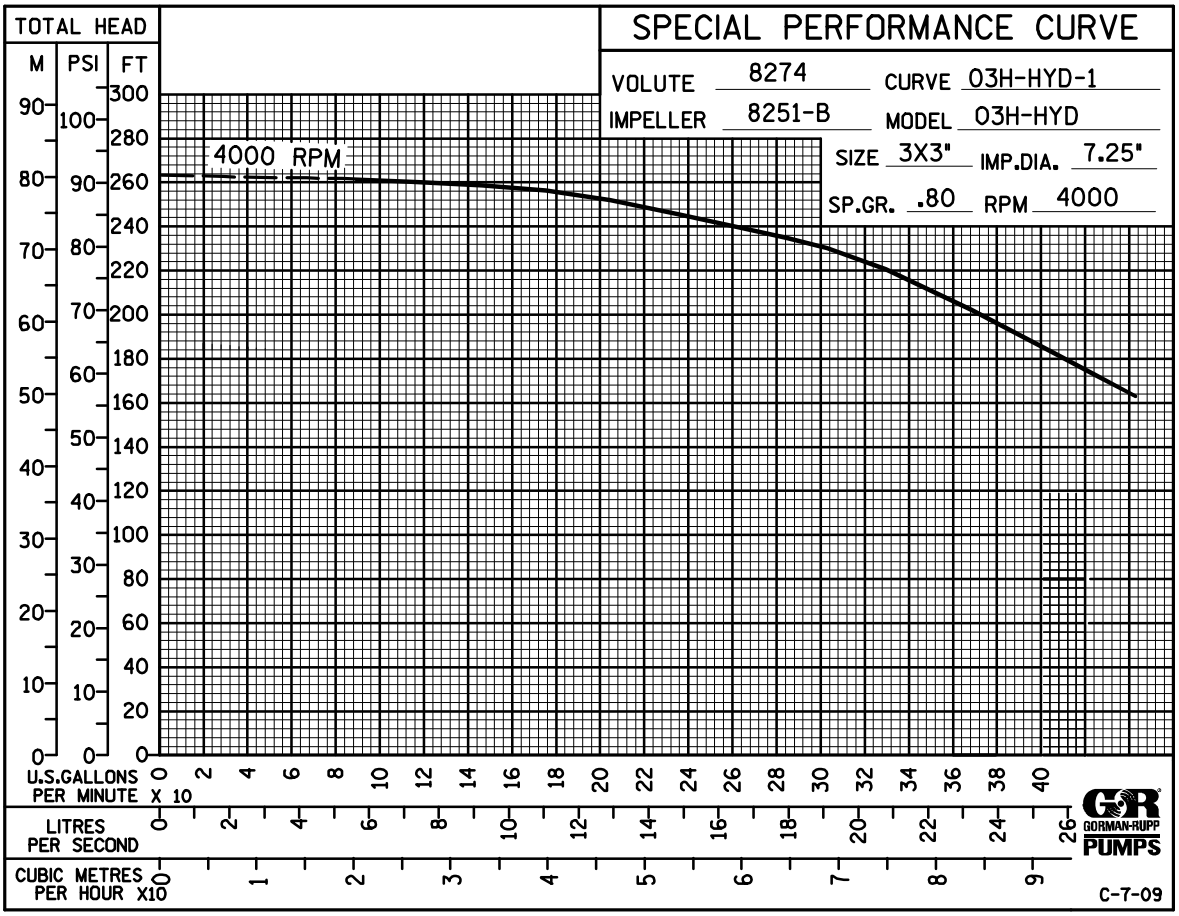
Item	Service Interval*				
	Daily	Weekly	Monthly	Semi-Annually	Annually
General Condition (Temperature, Unusual Noises or Vibrations, Cracks, Leaks, Loose Hardware, Etc.)	I				
Pump Performance (Gauges, Speed, Flow)	I				
Bearing Lubrication		I			R
Seal Lubrication (And Packing Adjustment, If So Equipped)		I			R
V-Belts (If So Equipped)			I		
Air Release Valve Plunger Rod (If So Equipped)			I	C	
Front Impeller Clearance (Wear Plate)				I	
Rear Impeller Clearance (Seal Plate)				I	
Check Valve					I
Pressure Relief Valve (If So Equipped)					C
Pump and Driver Alignment					I
Shaft Deflection					I
Bearings					I
Bearing Housing					I
Piping					I
Driver Lubrication — See Mfgr's Literature					

Legend:
I = Inspect, Clean, Adjust, Repair or Replace as Necessary
C = Clean
R = Replace

* Service interval based on an intermittent duty cycle equal to approximately 4000 hours annually. Adjust schedule as required for lower or higher duty cycles or extreme operating conditions.

PUMP MAINTENANCE AND REPAIR - SECTION E

MAINTENANCE AND REPAIR OF THE WEARING PARTS OF THE PUMP WILL MAINTAIN PEAK OPERATING PERFORMANCE.



✳ STANDARD PERFORMANCE FOR PUMP MODEL 03H1—HYD

✳ Based on 70° F (21° C) clear water at sea level with minimum suction lift, corrected to 0.80 specific gravity. Since pump installations are seldom identical, your performance may be different due to such factors as viscosity, specific gravity, elevation, temperature, and impeller trim.

If your pump serial number is followed by an “N”, your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify performance or part numbers.

CAUTION

Pump speed and operating condition points must be within the continuous performance range shown on the curve.

SECTION DRAWING

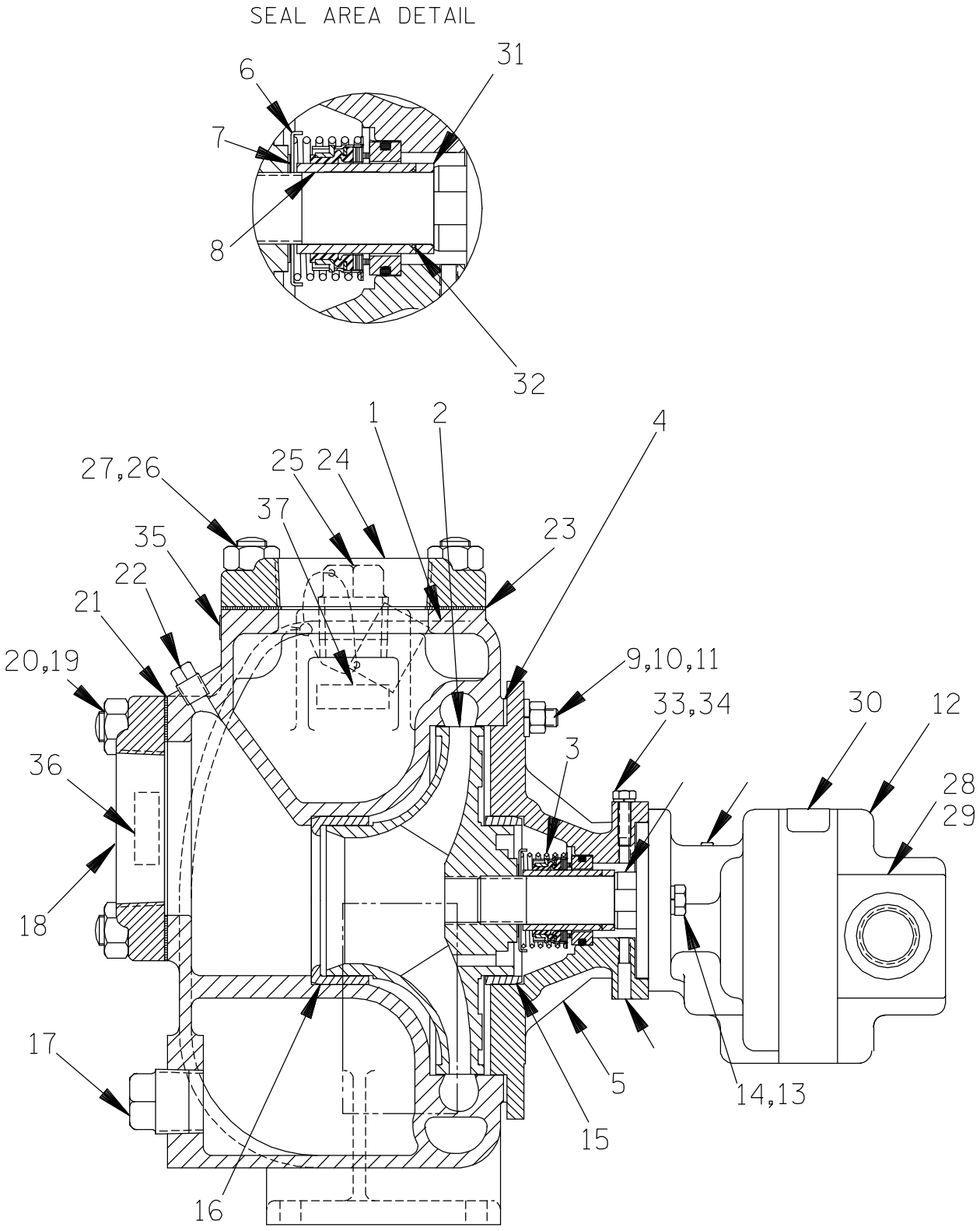


Figure 1. Pump Model 03H1–HYD

PARTS LIST
Pump Model 03H1–HYD
(From S/N 1451678 Up)

ITEM NO.		PART NAME	PART NUMBER	MAT'L CODE	QTY
1		PUMP CASING	8274	13040	1
2	✳	IMPELLER	8251B	13010	1
3	✳	SEAL ASSEMBLY	25271–192	–––	1
4	✳	CASING GASKET SET	3GC	20010	1
5		INTERMEDIATE	38263–303	13000	1
6		SPRING CENTERING WASHER	3929A	17000	1
7		IMPELLER ADJUSTING SHIM SET	2X	17090	1
8	✳	SHAFT SLEEVE	31441–029	16000	1
9		STUD	C0605–1/2	15991	8
10		LOCK WASHER	J06	15991	8
11		HEX NUT	D06	15991	8
12		HYDRAULIC MOTOR	24585–005	–––	1
13		HEX HD CAPSCREW	B0605	15991	2
14		LOCK WASHER	J06	15991	2
15	✳	WEAR RING	62ZL6	14000	1
16	✳	WEAR RING	62ZL5	14000	1
17		PIPE PLUG	P20	10009	1
18		SUCTION FLANGE	1390	13040	1
19		STUD	C1009	15991	4
20		HEX NUT	D10	15991	4
21	✳	SUCTION FLANGE GASKET	1318GB	20000	1
22		PIPE PLUG	P04	15079	1
23	✳	DISCHARGE FLANGE GASKET	1318GB	20000	1
24		DISCHARGE FLANGE	1390	13040	1
25		FILL PLUG ASSEMBLY	48271–065	–––	1
26		STUD	C1009	15991	4
27		HEX NUT	D10	15991	4
28		INLET DECAL	38816–348	–––	1
29		OUTLET DECAL	38816–349	–––	1
30		ROTATION DECAL	2613M	–––	1
31	✳	HARD WASHER	31414–182	16000	1
32	✳	O-RING	S2088	–––	1
33		HEX HD CAPSCREW	B0404	15991	1
34		LOCK WASHER	J04	15991	1
35		DISCHARGE STICKER	6588BJ	–––	1
36		SUCTION STICKER	6588AG	–––	1
37		PRIMING STICKER	6588AH	–––	1
NOT SHOWN:					
		NAME PLATE	38818–018	13990	1
		DRIVE SCREW	BM#04–03	17000	4

✳ INDICATES PARTS RECOMMENDED FOR STOCK

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

Review all SAFETY information in Section A.

Follow the instructions on all tags, label and decals attached to the pump.

This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts, follow these instructions which are keyed to the sectional view (see Figure 1) and the accompanying parts list.

Most service functions, such as impeller, wear ring, and seal replacement, may be performed by draining the pump and removing the pump casing. However, due to the confined mounting location of the pump, it is recommended that the pump and hydraulic motor be removed from the vehicle for service. The following instructions assume complete disassembly is required.

This manual will alert personnel to known procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel. However, this manual cannot possibly anticipate and provide detailed precautions for every situation that might occur during maintenance of the unit. Therefore, it is the responsibility of the owner/maintenance personnel to ensure that **only** safe, established maintenance procedures are used, and that any procedures not addressed in this manual are performed **only** after establishing that neither personal safety nor pump integrity are compromised by such practices.

Before attempting to service the pump, switch off the vehicle ignition and remove the key, or take other safety precautions to ensure that the pump will remain inoperative. Close all valves in the suction and discharge lines.

No instructions are provided in this manual for hydraulic motor maintenance. For information or technical assistance on the hydraulic motor, contact the hydraulic motor manufacturer through their website at **www.hydreco.com** and reference the following hydraulic motor model:

Hydreco Model #1512KC60A1FB

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Disconnect the power source, or take other precautions to ensure that the pump will remain inoperative.**
3. **Allow the pump to cool if overheated.**
4. **Check the temperature before opening any covers, plates, or plugs.**
5. **Close the suction and discharge valves.**
6. **Vent the pump slowly and cautiously.**
7. **Drain the pump.**

WARNING!

After the vehicle is positioned for pump maintenance, block the wheels and set the emergency brake before attempting to disconnect the drive shaft or remove the pump. Be sure the pump is properly reinstalled and secured before operation.

PUMP AND SEAL DISASSEMBLY

Removing Pump and Hydraulic Motor

Due to the confined mounting location, it is recommended that the pump and hydraulic motor be removed from the vehicle for service.

CAUTION

The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around the pump.

Due to the confined mounting location, specialized equipment such as a transmis-

sion jack with custom brackets should be used to lift and position the pump and hydraulic motor.

Close all valves in the suction and discharge lines. Remove the pump casing drain plug (17) and drain the pump.

CAUTION

When connecting or disconnecting hydraulic lines to the hydraulic motor, take precautions to prevent spillage of hydraulic fluid. Place a drip pan under the hydraulic motor to contain spills. Always clean up any spilled fluid immediately and dispose of any spillage and contaminated rags appropriately.

Disconnect the hydraulic lines and vent line from the hydraulic motor. Remove all the hardware securing the pump and hydraulic motor to the vehicle chassis. Tie and tag the any leveling shims used under the casing mounting feet to ease reassembly. Move the pump and hydraulic motor to a clean, well-equipped shop for maintenance and repair.

Pump Casing and Wear Ring Removal

To service the impeller (2), wear ring (16) or seal assembly (3), the pump casing (1) must be separated from the intermediate (5).

Remove the hardware (10 and 11) and separate the pump casing and casing gasket set (4) from the intermediate. Tie and tag the gaskets, or measure and record their thickness for ease of reassembly.

Clean the mating surfaces of the intermediate and pump casing. Inspect the wear ring (16) for excessive wear or scoring. The wear ring is secured in the pump casing by a press fit. If replacement is required, use a small bit to drill two holes through the ring horizontally, 180° apart. Use a chisel to complete the cuts through the ring, and remove it from the casing. **Use caution** not to damage the pump casing when removing the ring.

If the suction and discharge flanges (18 and 24) or gaskets (21 and 23) require replacement, remove the respective hardware (20 and 27) securing them to the pump casing.

Impeller Removal

To remove the impeller, secure the hydraulic motor vertically in a large vise. There is a flat milled on the surface of the hydraulic motor shaft. Insert a probe into the hole in the bottom of the intermediate (5) while rotating the impeller until the flat on the shaft can be felt with the probe. Remove the probe and install a 1/4—20 UNC by 1/2-inch long setscrew into the hole until seated against the flat on the shaft. Tighten the screw securely to prevent shaft rotation.

CAUTION

When using a strap wrench to remove the impeller as described below, use caution not to damage the machined surface on the O.D. of the impeller.

Install a strap wrench around the O.D. of the impeller just behind the machined surface that seats inside the wear ring (16). Strike the handle of the strap wrench sharply with a hammer in a counterclockwise direction. When the impeller breaks loose, remove the strap wrench.

CAUTION

Before proceeding to remove the impeller, slightly loosen the setscrew used to prevent rotation of the hydraulic motor shaft. **This is critical**. The setscrew can deflect the hydraulic motor shaft, causing the impeller to bind and scrape against the wear ring (15) as the impeller is unscrewed. Failure to loosen the setscrew can result in damage to the impeller and/or wear ring.

After loosening the setscrew, unscrew the impeller from the shaft. Use caution when removing the impeller; tension on the seal spring will be released as the impeller is removed.

Seal Removal and Disassembly

(Figures 1 and 2)

Remove the adjusting shims (7). Tie and tag the shims or measure and record their thickness for ease of reassembly.

Remove the spring centering washer (6) and seal spring. Slide the shaft sleeve (8) and rotating portion of the seal off the shaft as a unit. Apply oil to the sleeve and work it up under the bellows. Slide the rotating portion of the seal off the sleeve.

Remove the hardware (13 and 14) and separate the intermediate from the hydraulic motor (12). Use a dowel or other suitable tool to press the seal stationary element out of the intermediate from the back side.

Slide the hardwasher and O-ring (31 and 32) off the shaft.

Inspect the wear ring (15) for excessive wear or damage. The wear ring is secured in the intermediate by a press fit. If replacement is required, use a small bit to drill two holes through the ring horizontally, 180° apart. Use a chisel to complete the cuts through the ring, and remove it from the intermediate. **Use caution** not to damage the intermediate when removing the ring.

If no further disassembly is required, proceed with **PUMP AND SEAL REASSEMBLY**.

PUMP AND SEAL REASSEMBLY

Seal Reassembly and Installation

(Figures 1 and 2)

Clean the seal cavity and shaft with a cloth soaked in fresh cleaning solvent.

WARNING!

Most cleaning solvents are toxic and flammable. Use them only in a well-ventilated area free from excessive heat, sparks, and flame. Read and follow all precautions printed on solvent containers.

The seal is not normally reused because wear patterns on the finished faces cannot be realigned during reassembly. This could result in premature failure. If necessary to reuse an old seal in an emergency, carefully wash all metallic parts in **fresh** cleaning solvent and allow to dry thoroughly.

Handle the seal parts with extreme care to prevent damage. Be careful not to contaminate precision finished faces; even fingerprints on the faces can shorten seal life. If necessary, clean the faces with a non-oil based solvent and a clean, lint-free tissue. Wipe **lightly** in a concentric pattern to avoid scratching the faces.

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. Clean and polish the shaft sleeve, or replace it if there are nicks or cuts on either end. If any components are worn, replace the complete seal; **never mix old and new seal parts**.

If a replacement seal is being used, remove it from the container and inspect the precision finished faces to ensure that they are free of any foreign matter.

To ease installation of the seal, lubricate the stationary seat O-ring and shaft sleeve with water or a very **small** amount of oil, and apply a drop of light lubricating oil on the finished faces. Assemble the seal as follows, (see Figure 2).

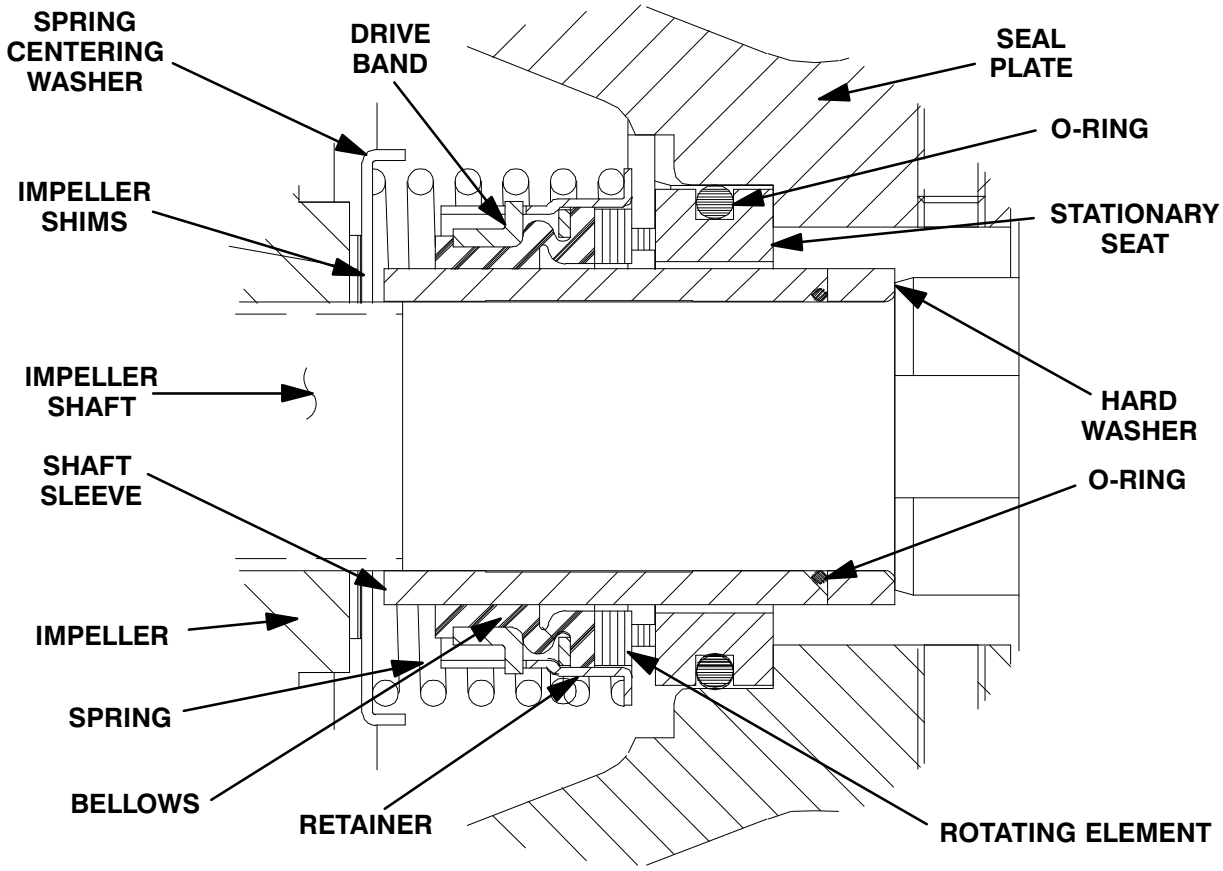


Figure 2. 25271—192 Seal Assembly

CAUTION

This seal is not designed for operation at temperatures above 160°F (71°C). Do not use at higher operating temperatures.

Inspect the hydraulic motor shaft for distortion, nicks, scratches, or damage to the shaft keyway. Dress small nicks or burrs with a fine file or emery cloth. If excessive wear exists, the shaft or hydraulic motor will require replacement (consult the hydraulic motor manufacturer as indicated at the beginning of this section).

Position the intermediate on the bed of an arbor (or hydraulic) press, and press the replacement ring into the intermediate until it seats squarely against the bore shoulder.

CAUTION

The wear ring **must** seat squarely in the intermediate bore; otherwise binding and/or excessive wear will result.

Position the intermediate against the hydraulic motor face with the tapped hole for the motor shaft locking device facing down (see Figure 1). Secure the intermediate to the hydraulic motor with the hardware (13 and 14).

Slide the hard washer (31) onto the shaft until the chamfered end seats squarely against the shaft shoulder. Lightly lubricate the O-ring (32) and slide it onto the shaft until it is fully seated against the hard washer.

Lubricate the stationary seat O-ring with light oil and install it in the groove in the seat. Use thumb pressure to press this subassembly into the intermediate until it seats squarely against the shoulder bore. Be careful not to damage the seal face. After installation, wipe the seal face in a concentric pattern with a clean, lint-free cloth to remove any fingerprints.

Subassemble the rotating element into the retainer and bellows, and slide this subassembly over the

lubricated shaft sleeve (8) until the rotating element is just flush with the chamfered end of the sleeve. Slide the sleeve and rotating portion of the seal onto the shaft until the seal faces contact. Continue to push the sleeve through the seal until the sleeve is fully seated against the hard washer.

Install the seal spring and spring centering washer (6). Make sure that all components of the seal are seated squarely.

Impeller Installation

(Figures 1 and 3)

CAUTION

Make sure the setscrew used to immobilize the hydraulic motor shaft is **just snug** against the shaft. If the setscrew is too tight, shaft deflection can cause the impeller to scrape and bind against the wear ring (15) during installation.

Inspect the impeller (2), and replace it if cracked or badly worn.

Install the same thickness of impeller adjusting shims as previously removed and screw the impeller onto the shaft until tight.

Remove the setscrew used to immobilize the hydraulic motor shaft from the hole in the intermediate and reinstall the hardware (30 and 31) in the hole.

CAUTION

The setscrew used to immobilize the hydraulic motor shaft must be removed before reinstalling the hardware (30 and 31) and putting the pump back into service. Otherwise, damage to the pump and/or hydraulic motor will occur.

NOTE

After the impeller has been installed, check for free rotation. Correct any scraping or binding before further reassembly.

Pump Casing and Wear Ring Installation

If the suction and discharge flanges (18 and 24) were removed, install the gaskets (21 and 23) and secure the flanges to the pump casing with the respective hardware (20 and 27).

If the wear ring (16) was removed for replacement, press the replacement ring into the pump casing until it seats squarely against the shoulder bore.

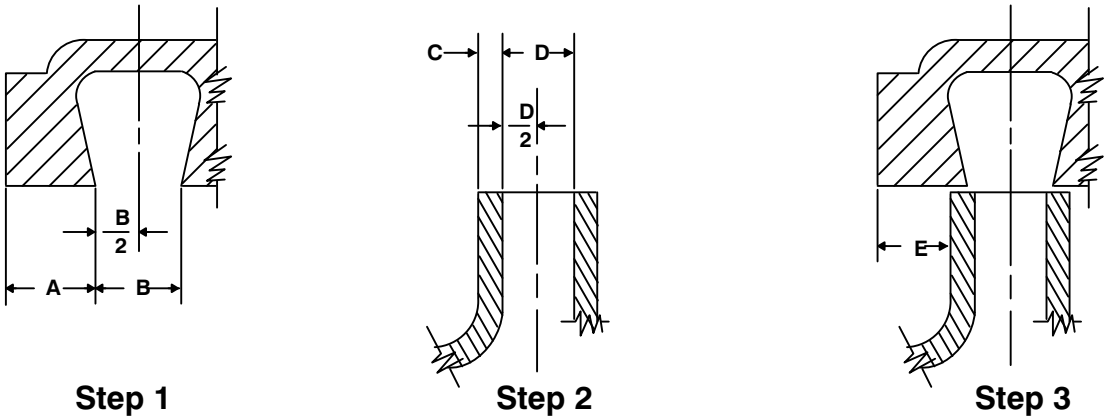
CAUTION

The wear ring **must** seat squarely in the casing bore; otherwise binding and/or excessive wear will result.

For maximum pump efficiency, the impeller should be centered within the pump casing. To verify impeller positioning, measure the pump casing and impeller as shown in Figure 3. Use these measurements to calculate the required impeller location (dimension E). Add or remove gaskets in the pump casing gasket set (4) to obtain dimension E.

NOTE

When calculating pump casing positioning, figure 30% compression for pump casing gaskets.



$$\left(A+\frac{B}{2}\right)-\left(C+\frac{D}{2}\right)=E$$

Figure 3. Centering Impeller Within Pump Casing

Install the calculated thickness of pump casing gaskets, and secure the pump casing to the seal plate with the hardware (10 and 11).

Installing Pump and Hydraulic Motor

Secure the pump and hydraulic motor to the truck chassis with the previously removed hardware. Be sure to install any leveling shims used under the casing mounting feet.

Reconnect the hydraulic supply lines to the designated ports in the motor. Reconnect the hydraulic motor vent line.

Install the suction and discharge lines and open all valves. Make certain that all piping connections are tight, properly supported and secure.

Fill the pump casing with clean liquid. Reinstall the fill plug (25) and tighten it.

Refer to **OPERATION**, Section C, before putting the pump back into service.

LUBRICATION

Seal Assembly

The seal assembly is lubricated by the medium being pumped and no additional lubrication is required.

For U.S. and International Warranty Information,
Please Visit www.grpumps.com/warranty
or call:
U.S.: 419—755—1280
International: +1—419—755—1352

For Canadian Warranty Information,
Please Visit www.grcanada.com/warranty
or call:
519—631—2870

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